Economic analysis of alternative systems for sorghum production in southern Mali

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Key messages

- Manure and mineral fertilizer treatment provides highest grain yields and net returns compared to the farmer practice which doesn't apply fertilizers in the fields.
- The adoption of fertilizer options by the smallholder farmers should be accompanied by the development strategies of inputs market particularly manure and mineral fertilizers in order to make them available.

Objectives and approach

- **Objectives**: aim to compare and contrast the four crop treatments with respects their economic advantages and production risks (control treatment, treatment with only manure, treatment with mineral fertilizer, and treatment with manure and mineral fertilizer).
- **Approach:** Cost/benefit analysis and stochastic dominance are used to assess grain yields and cash income associated with each treatment. The study used on-farm trials data covering the periods 2014 and 2015.

Key results

- Control treatment (farmer practice) is to the left of the manure and fertilizer treatments illustrating the fact that it provides low yields compared to the three other cropping treatments (figure).
- The control treatment has a 50% chance of generating grain yields up to 850 kg/ha, while the manure treatment, mineral fertilizer treatment, and manure and mineral fertilizer treatment have the same probability of generating respectively 1,050 kg/ha, 1,275 kg/ha, and 1500 kg/ha (figure).
- The average net returns were estimated to USD 121.63 for manure and mineral fertilizer treatment, USD 87.20 for treatment with only mineral fertilizer, and USD 83.58 for treatment with only manure (table).

Significance and scaling potential

- The results show that the fertilizer options promoted by the Africa RISING in sorghum production systems contribute to increase sorghum yields and income of smallholder farmers in the intervention areas.
- The second phase of the project should develop the strategies for a large diffusion of these fertilizer options for more impact in terms of reduction of hunger and poverty in Mali.

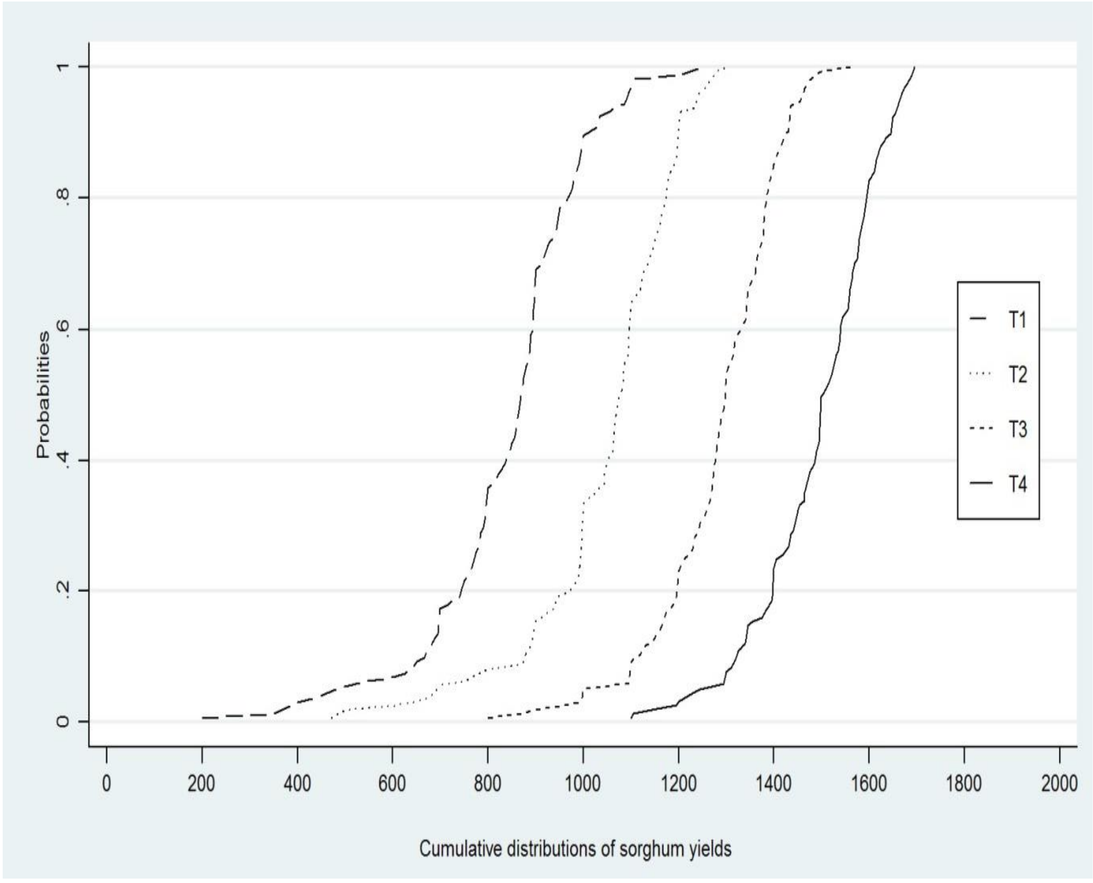

Figure: Cumulative distributions of sorghum yields

Table: Effect of cropping treatments on net returns of sorghum

	2014 - 2015		
Treatments	Gross margin	Total cost	Net return
	(USD/ha)	(USD/ha)	(USD/ha)
Traditional system (control treatment)	64.70[a]	8.45[a]	55.27[a]
Treatment with only manure	99.37[b]	15.80[b]	83.58[b]
Treatment with only fertilizer	123.58[c]	36.38[c]	87.20[d]
Treatment with manure and fertilizer	165.90[d]	44.28[d]	121.63[d]

Partners

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